Department of Defense
A Catalyst to Commercialization

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Report Documentation Page

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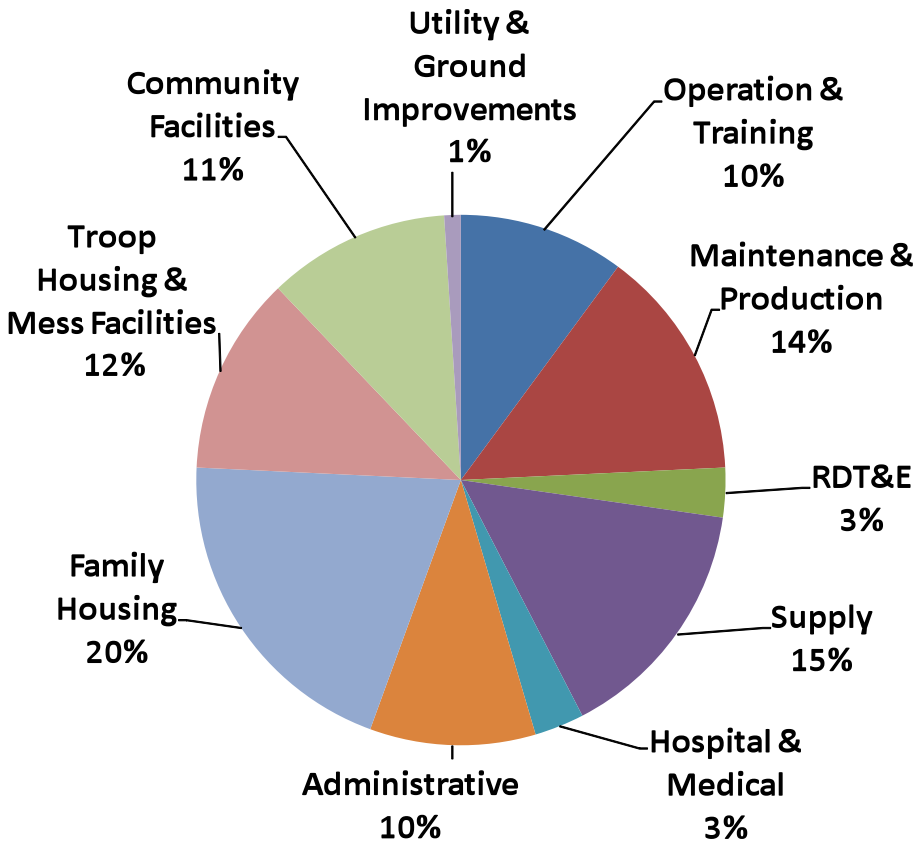
Key Points

- DoD is committed to using resources in a more sustainable manner…Why?
- DoD High Performance Buildings policy offers flexibility while insisting on life-cycle cost effectiveness
- DoD is ready to be an early adopter and catalyst for commercialization of sustainable technologies

DoD: BIG and Diverse

- 307,295 buildings
  - 2.2 billion square feet
- Comparisons
  - GSA: 1,500 government buildings
    - 176 million square feet
  - Wal-Mart US: 4,200 buildings
    - 687 million square feet
- 160,000 Fleet Vehicles

DoD Building Stock



Sustainability: More than a Buzzword

- Using Resources Sustainably Offers Key Military Advantages
  - Friendly forces are less vulnerable
  - Less “tail” = More “tooth”
  - Reduced pressure on key resources may reduce odds of future conflict

DoD Policy: Flexible, Yet Focused

- All major building construction: LEED Silver (or equal)
- 40% of LEED score from energy & water reduction
- Compliance with Guiding Principles
- Life-cycle cost effective

OCT 2 3 2010

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY
(INSTALLATIONS, ENERGY AND ENVIRONMENT)
ASSISTANT SECRETARY OF THE NAVY (ENERGY,
INSTALLATIONS AND ENVIRONMENT)
ASSISTANT SECRETARY OF THE AIR FORCE (INSTALLATIONS,
ENVIRONMENT AND LOGISTICS)
DIRECTORS OF DEFENSE AGENCIES
DIRECTOR, WASHINGTON HEADQUARTERS SERVICES

SUBJECT: Department of Defense Sustainable Buildings Policy

Deputy Under Secretary of Defense
(Installations & Environment)

Attachment:
As stated

210 LEED Certified Facilities

New Construction

Major Renovation

Variety


Hangar, Ft Smith - LEED Silver


BEQ, Bremmerton - LEED Silver


Brigade HQ, Ft Carson - LEED Gold


C-17 Hangar, Travis AFB, CA – LEED Silver

BIG: Challenge and Opportunity

- Challenge
  - BIG portfolio plus declining budget
  - Implication: "Greening" the portfolio building-by-building will take a long time
- Opportunity
  - Variety of building types
  - Covering all climate zones
  - Installations like small cities
  - Implication:
    - Think outside the "box"
    - Test new technologies

Installation Energy Test Bed

- Emerging technologies hold great promise, but face major impediments to commercialization and deployment
  - Building industry is highly fragmented
  - First user bears significant costs
  - A&E firms face liabilities but do not share in savings
  - Lack of operational testing deters potential adopters
  - DoD is uniquely positioned to help overcome these barriers
  - It is in DoD's self interest given the size of our inventory (Wal-Mart has its own energy test bed but it is limited to big-box stores)
  - DoD's built infrastructure is unique for its size and variety— it captures the diversity of building types and climates in U.S.
  - Military has 150 years of experience as a sophisticated first user of new technology and an early, market-creating customer (jet engines, aircraft, integrated circuits, GPS, internet)

Installation Energy Test Bed

- Use DoD Facilities as Test Bed for Innovative Energy Technologies
  - Validate performance, cost, and environmental impacts
  - Transfer lessons learned, design and procurement information across all Services and installations
  - Directly reach out to private sector for innovations
  - Leverage DOE investments
- Develop, Test & Evaluate for All DoD Facilities
  - Advanced components to improve building energy efficiency
  - Advanced building energy management and control
  - Smart microgrid and energy storage to improve energy security
  - Tools and processes for design, assessment and decision-making for energy use and management
  - Renewable energy generation on DoD installations
  - http://www.serdp.org/Funding-Opportunities/ESTCP-Solicitations

Building Integrated PV

Acquisition, Technology and Logistics

DESCRIPTION

- *Validate whether BIPV roofs can endure weather conditions as well as conventional roofs*
  - *Luke AFB, MCAS Yuma, NAS Patuxent*
- *Verify whether a roof integrated solar photovoltaic system can perform as a cost effective energy efficient roof*
- *Promote adoption of BIPV roof technology within DoD through the Unified Facilities Guide Specification (UFGS)*

BENEFITS/METRICS

- *Demonstrations will document energy savings, costs, reliability and applicability to DoD roofs*
- *Effectively low cost per Watt installed*

PERFORMERS

- *NAVFAC ESC*
- *Lawrence Berkeley National Laboratory*
- *ERDC- CERL*
- *SEI Group, Inc*

Continuous Building Commissioning

DESCRIPTION

Objectives are to demonstrate whole-building modeling and monitoring systems capable of:

1) *identifying, classifying, and quantifying energy and water consumption deviations from design intent or optimal,*
2) *identifying the causes of those deviations, and*
3) *recommending, prioritizing, and implementing corrective actions.*

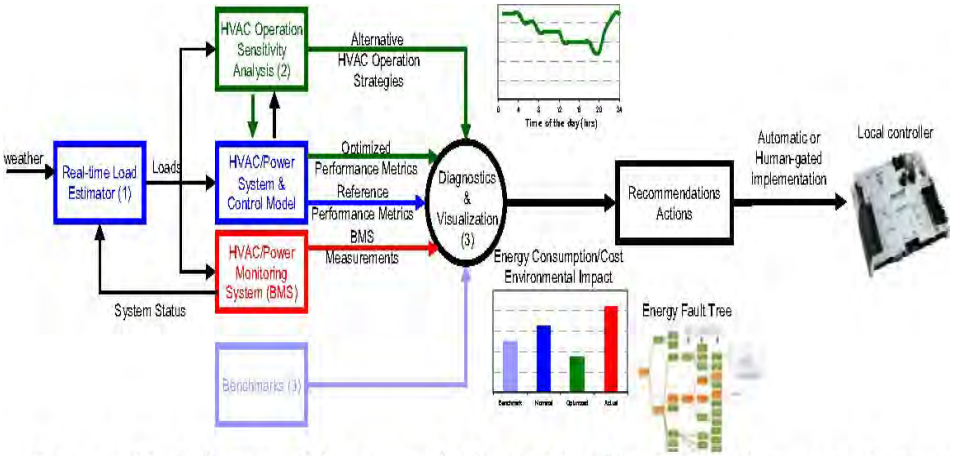


Figure 1. Block diagram of the proposed Advanced Building Energy Management Systems

BENEFITS/METRICS

- *Demonstrations will document energy savings, costs, reliability and applicability to DoD buildings.*
- *Successful implementation of this technology will enable reduced energy consumption, peak electric demand, and water use in DoD buildings by providing actionable information to facility managers and building operators.*

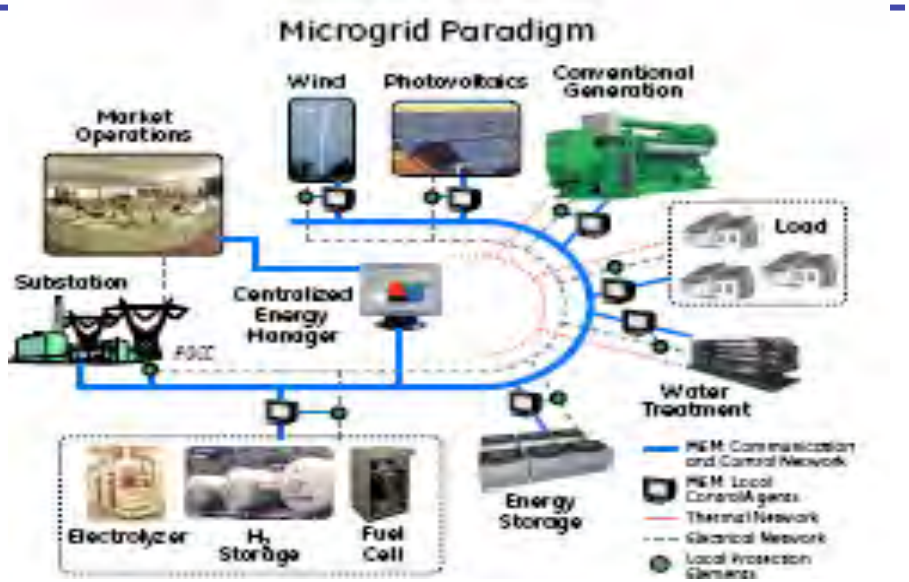
PERFORMERS

- *United Technologies Research Center*
  - *Lawrence Berkeley National Laboratory*
  - *University of California, Berkeley*
- *Multiple Projects*
  - *Model based performance of single buildings*
  - *Scalability through reduced order models*
  - *Campus scale*

Smart Micro-Grids

DESCRIPTION

- *Enhance and demonstrate an advanced micro grid technology for DoD installations*
  - *Microgrid design*
  - *Optimal dispatch*
  - *Load shedding*
  - *Intentional islanding*
  - *Energy management*
- *Demonstrations at 29 Palms and Ft. Bliss*



BENEFITS/METRICS

- *Allow secure islanding of DoD installation and reduce costs of electricity*
- *Increase use renewables, energy efficiency and improve power quality*

PERFORMERS

- *GE Global Research*
  - *29 Palms*
- *Lockheed Martin*
  - *Ft. Bliss*
- *FY 2012 BAA*
  - *TBD*

Low-BTU Landfill Gas Turbine

DESCRIPTION

- *Establish economics, reliability, and applicability of the technology to a variety of DoD installations.*
- *Demonstrate the ability of a unique micro-turbine to generate electrical power from Landfill Gases.*
- *Demonstration at Ft. Benning*

BENEFITS/METRICS

- *Landfill gas energy capture technology will reduce the cost of DoD facility energy.*
- *High number of landfills on DoD installations, implementation of these technologies can yield enormous cost savings and energy security.*

PERFORMERS

- *Southern Research Institute*
  - *Greenhouse Gas Institute*
- *Flex Energy*
- *SCS Engineers*
- *Integrity Air Monitoring*

Conclusion

- DoD is committed to using resources in a more sustainable manner…Why?
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